<table>
<tr><td>Grade: 5

Unit 5 –Numbers and Operations With Division Using Whole Numbers and Decimals</td><td colspan="2">Subject: Math
Time Frame: 18 days
Domains: Number and Operations in Base Ten</td></tr>
<tr><td>Standards</td><td>Content Standards:
5.NBT.2, 5.NBT.3, 5.NBT.5, 5.NBT.6, 5.NBT.7
http://www.corestandards.org/wp-content/uploads/Math_Standards.pdf</td><td>Practice Standards:
MP 1, 2, 3, 4, 5, 6, 7, 8</td></tr>
<tr><td>Enduring Understandings</td><td colspan="2">1. We use division to find equal groups or the number of things in a given amount of groups.
2. We can show division with equations, arrays, and area models.
3. Express and interpret remainders for a variety of problem types.
4. Solve division problems that have decimal divisors.
5. Solve division problems in which both numbers are decimals.
6. Solve division problems involving whole numbers and decimal numbers.
7. Explain how to compute with decimals using concrete models or drawings.</td></tr>
<tr><td>Essential Questions</td><td colspan="2">1. How can I divide multi-digit whole numbers?
2. How do you use multiples of ten to estimate and find quotients?
3. How does a digit's position affect its value?
4. How do we divide large numbers?
5. Which strategies can we use to divide large numbers?
6. How can I divide multi-digit whole numbers?
7. How do we divide decimals and what does our solution mean?</td></tr>
<tr><td>Vocabulary</td><td colspan="2">online dictionary visual math dictionary

powers of 10, exponent, decimal, decimal place, expanded form, word form, >, <, =,
standard algorithm, multiply, product, factor, dividend, divisor, array, area model, quotient, decimal, tenths, hundredths, add, subtract, multiply, divide, addend, sum, difference, factor, product, quotient, whole number</td></tr>
</table>

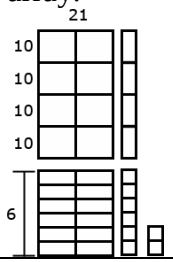
Priority and Supporting CCSS	Explanations and Examples*
5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	**5.NBT.2** Examples: Students might write: • $36 \times 10 = 36 \times 10^1 = 360$ • $36 \times 10 \times 10 = 36 \times 10^2 = 3600$ • $36 \times 10 \times 10 \times 10 = 36 \times 10^3 = 36{,}000$ • $36 \times 10 \times 10 \times 10 \times 10 = 36 \times 10^4 = 360{,}000$ Students might think and/or say: • I noticed that every time, I multiplied by 10 I added a zero to the end of the number. That makes sense because each digit's value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the left. • When I multiplied 36 by 10, the 30 became 300. The 6 became 60 or the 36 became 360. So I had to add a zero at the end to have the 3 represent 3 one-hundreds (instead of 3 tens) and the 6 represents 6 tens (instead of 6 ones). Students should be able to use the same type of reasoning as above to explain why the following multiplication and division problem by powers of 10 make sense. • $523 \times 10^3 = 523{,}000$ (The place value of 523 is increased by 3 places.) • $5.223 \times 10^2 = 522.3$ (The place value of 5.223 is increased by 2 places.) • $52.3 \div 10^1 = 5.23$ (The place value of 52.3 is decreased by one place.)

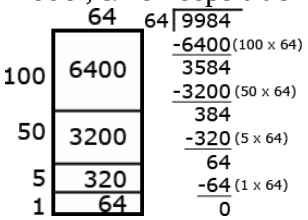
*Source – Connecticut Core Standards for Mathematics as adapted from the Arizona Academic Content Standards

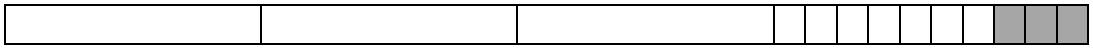
Priority and Supporting CCSS	Explanations and Examples*
5.NBT.3 Read, write, and compare decimals to thousandths. **a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, *e.g.*, *347.392 = 3 × 100 + 4 ×10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).*** **b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.**	**5.NBT.3** Students build on the understanding they developed in fourth grade to read, write, and compare decimals to thousandths. They connect their prior experiences with using decimal notation for fractions and addition of fractions with denominators of 10 and 100. They use concrete models and number lines to extend this understanding to decimals to the thousandths. Models may include base ten blocks, place value charts, grids, pictures, drawings, manipulatives, technology-based, etc. They read decimals using fractional language and write decimals in fractional form, as well as in expanded notation as show in the standard 3a. This investigation leads them to understanding equivalence of decimals (0.8 = 0.80 = 0.800). Example: Some equivalent forms of 0.72 are: 72/100 70/100 + 2/100 7/10 + 2/100 0.720 7 × (1/10) + 2 × (1/100) 7 × (1/10) + 2 × (1/100) + 0 × (1/1000) 0.70 + 0.02 720/1000 Students need to understand the size of decimal numbers and relate them to common benchmarks such as 0, 0.5 (0.50 and 0.500), and 1. Comparing tenths to tenths, hundredths to hundredths, and thousandths to thousandths is simplified if students use their understanding of fractions to compare decimals. Example: Comparing 0.25 and 0.17, a student might think, “25 hundredths is more than 17 hundredths”. They may also think that it is 8 hundredths more. They may write this comparison as 0.25 > 0.17 and recognize that 0.17 < 0.25 is another way to express this comparison. Comparing 0.207 to 0.26, a student might think, “Both numbers have 2 tenths, so I need to compare the hundredths. The second number has 6 hundredths and the first number has no hundredths so the second number must be larger. Another student might think while writing fractions, “I know that 0.207 is 207 thousandths (and may write 207/1000). 0.26 is 26 hundredths (and may write 26/100) but I can also think of it as 260 thousandths (260/1000). So, 260

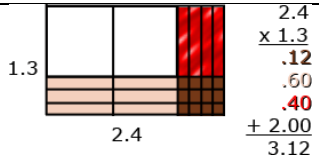
	thousandths is more than 207 thousandths

Priority and Supporting CCSS	Explanations and Examples*
5. NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.	**5. NBT.5** In prior grades, students used various strategies to multiply. Students can continue to use these different strategies as long as they are efficient, but must also understand and be able to use the standard algorithm. In applying the standard algorithm, students recognize the importance of place value. Example: • 123 x 34. When students apply the standard algorithm, they, decompose 34 into 30 + 4. Then they multiply 123 by 4, the value of the number in the ones place, and then multiply 123 by 30, the value of the 3 in the tens place, and add the two products.

Priority and Supporting CCSS	Explanations and Examples*
5. NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	**5. NBT.6** In fourth grade, students' experiences with division were limited to dividing by one-digit divisors. This standard extends students' prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a "familiar" number, a student might decompose the dividend using place value. Examples: • Using expanded notation ~ 2682 ÷ 25 = (2000 + 600 + 80 + 2) ÷ 25 • Using his or her understanding of the relationship between 100 and 25, a student might think: • I know that 100 divided by 25 is 4 so 200 divided by 25 is 8 and 2000 divided by 25 is 80. • 600 divided by 25 has to be 24. • Since 3 x 25 is 75, I know that 80 divided by 25 is 3 with a reminder of 5. (Note that a student might divide into 82 and not 80) • I can't divide 2 by 25 so 2 plus the 5 leaves a remainder of 7. • 80 + 24 + 3 = 107. So, the answer is 107 with a remainder of 7. Using an equation that relates division to multiplication, 25 x *n* = 2682, a student might estimate the answer to be slightly larger than 100 because s/he recognizes that 25 x 100 = 2500. Example: 968 ÷ 21 • Using base ten models, a student can represent 962 and use the models to make an array with one dimension of 21. The student continues to make the array until no more groups of 21 can be made. Remainders are not part of the array. 

	Example: 9984 ÷ 64 • An area model for division is shown below. As the student uses the area model, s/he keeps track of how much of the 9984 is left to divide.  Technology Connections: • Models created using IWB software (such as SMART Notebook) • Array tools • http://illuminations.nctm.org/ActivityDetail.aspx?ID=64

Priority and Supporting CCSS	Explanations and Examples*
5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	**5.NBT.7** This standard requires students to extend the models and strategies they developed for whole numbers in grades 1-4 to decimal values. Before students are asked to give exact answers, they should estimate answers based on their understanding of operations and the value of the numbers. Examples: • 3.6 + 1.7 [A student might estimate the sum to be larger than 5 because 3.6 is more than 3 ½ and 1.7 is more than 1 ½.] • 5.4 – 0.8 [A student might estimate the answer to be a little more than 4.4 because a number less than 1 is being subtracted.] • 6 x 2.4 [A student might estimate an answer between 12 and 18 since 6 x 2 is 12 and 6 x 3 is 18. Another student might give an estimate of a little less than 15 because s/he figures the answer to be very close, but smaller than 6 x 2 ½ and think of 2 ½ groups of 6 as 12 (2 groups of 6) + 3 (½ of a group of 6.)] Students should be able to express that when they add decimals they add tenths to tenths and hundredths to hundredths. So, when they are adding in a vertical format (numbers beneath each other), it is important that they write numbers with the same place value beneath each other. This understanding can be reinforced by connecting addition of decimals to their understanding of addition of fractions. Adding fractions with denominators of 10 and 100 is a standard in fourth grade. Example: 4 - 0.3 • 3 tenths subtracted from 4 wholes. The wholes must be divided into tenths.  The answer is 3 and 7/10 or 3.7. Example: An area model can be useful for illustrating products.

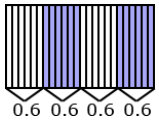


Students should be able to describe the partial products displayed by the area model. For example,

"3/10 times 4/10 is 12/100.
3/10 times 2 is 6/10 or 60/100.
1 group of 4/10 is 4/10 or 40/100.
1 group of 2 is 2."

Example of division: finding the number in each group or share

• Students should be encouraged to apply a fair sharing model separating decimal values into equal parts such as

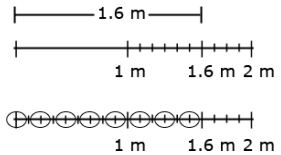


Example of division: find the number of groups

• Joe has 1.6 meters of rope. He has to cut pieces of rope that are 0.2 meters long. How many can he cut?

• To divide to find the number of groups, a student might:

- draw a segment to represent 1.6 meters. In doing so, s/he would count in tenths to identify the 6 tenths, and be able identify the number of 2 tenths within the 6 tenths. The student can then extend the idea of counting by tenths to divide the one meter into tenths and determine that there are 5 more groups of 2 tenths.



- count groups of 2 tenths without the use of models or diagrams. Knowing that 1 can be thought of as 10/10, a student might think of 1.6 as 16 tenths. Counting

	2 tenths, 4 tenths, 6 tenths, . . .16 tenths, a student can count 8 groups of 2 tenths. • use their understanding of multiplication and think, "8 groups of 2 is 16, so 8 groups of 2/10 is 16/10 or 1 6/10." Technology Connections: Create models using Interactive Whiteboard software(such as SMART Notebook)

Resources
Math Expressions–Unit 5, Lessons 1-11 Soar to Success Math Intervention Mega Math Destination Math Common Core Mathematics-Newmark Learning- Units-1 Xtramath.org Connecticut State Department of Education http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320872

Unit Assessments
Unit Test Formative Assessments (Math Expressions) Quick Quizzes Performance Task Alternative Formative or Unit Assessment: http://3-5cctask.ncdpi.wikispaces.net/5.NBT.5-5.NBT.7

Technology: Videos, Websites, Links
www.learnzillion.com https://grade5commoncoremath.wikispaces.hcpss.org/5.NBT.2 https://grade5commoncoremath.wikispaces.hcpss.org/5.NBT.3 https://grade5commoncoremath.wikispaces.hcpss.org/5.NBT.5 https://grade5commoncoremath.wikispaces.hcpss.org/5.NBT.6 https://grade5commoncoremath.wikispaces.hcpss.org/5.NBT.7